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Diversity of Butterflies in the Selected Key Biodiversity Areas of Mindanao, Philippines

ALMA B. MOHAGAN
almohagan@gmail.com
Faculty Researcher and Curator, Zoology Section,
University Museum
Central Mindanao University

DAVE P. MOHAGAN
dalzy@gmail.com
Research Assistant, Central Mindanao University

ANTONIO E. TAMBULI
papilio7553@yahoo.com
Professor, USC Biological Sciences

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Abstract - Butterflies are important for pollination of many farm crops and forest species, biomass converter, agent of controlling weeds, source of drugs and genetic material for the development of new breeds. The study provided information on the species level-diversity, status and similarity of butterfly species composition in 4 selected Key Biodiversity areas of Mindanao at the eminent climate change. Data can be used for species monitoring, distribution, biogeography and conservation of butterflies in Mindanao, Philippines as climate change progresses. Belt transect, time constraint and transect walk sampling were employed in the study from February

2010 to April 2011. We captured a total of 247 identified butterfly species. Species diversity level using Shannon-Weiner index showed fair level in most of the sampling sites. Highest species richness was observed in Mt. Kitanglad H'1.959 (148 species), followed by Mt. Apo H'=1.755 (104 species), Mt. Timpoong H'=1.579 (79 species) lowest in Mt. Musuan H'=. Mt. Apo had the highest species endemism (42 0r 42 %). Endemism is higher in forest habitats in higher elevations. Bray-Curtis analysis showed that all study sites are unique habitats for butterflies. The results suggest further monitoring to carefully analyze the diversity and status of butterflies.

Keywords - Butterfly, diversity, Key Biodiversity Areas

INTRODUCTION

Butterflies as environment indicators are easily affected by environmental stresses. They are good model organisms for study because of their sensitivity to changes of weather conditions, ecological and ecological changes.

Butterflies play an important role in our ecosystems. Ecologically and Socio economically, they are considered as biological components which affect human life in various ways either directly or indirectly, and in tangible or intangible manner. Their larvae transform millions of tons of plant matter into animal matter and waste matter and are eaten by other animals or eventually recycled into plant matter. The larvae help in controlling weeds and also in cross pollination of many flowering plants (Treadaway 1995) and are sources of genetic material for gene diversity (Cheng 1993). They can be biological indicators for environmental quality and component of natural landscape (Cheng 1993). Butterfly habitats depict the quality of existence of their natural landscape and are indicators of biologically rich environment.

Despite their usefulness, studies leading to the conservation of the Philippine butterflies and the influence of vegetation types on

their existence are so scanty especially in Mindanao (Gapud 2005). This present study focuses on the diversity of butterflies in the four mountains ecosystems of Mindanao. Specifically aimed to provide information on species composition, diversity and status of butterflies in Mt. Apo, Mt. Kitanglad, Mt. Timpoong and Mt.Musuan with sampling happened at the eminent condition of alternating La Niño in the first half and La Niña in the second half of sampling period. The study sites ecological conditions ranges from 9-32 degrees Celsius for temperature along elevation gradient, relative humidity from 88-100% differs from vegetation type to another.

MATERIALS AND METHODS

Study Area and the sampling sites

The study was conducted in selected sites of four mountains in Mindanao. The three mountain sites in Mindanao are key biodiversity areas namely: Mt. Kitanglad (Bukidnon), Mt. Timpoong Camiguin, Mt, Apo (Cotabato Province), and Mt. Musuan (Fig.1). The sites are characterized by different vegetation types: agroecosystem, dipterocarp, montane and mossy forest except for Mt. Musuan which has agroecosystem and mix lowland dipterocarp forest only.

Fig. 1. Map of the Philippines showing the study sites. The orange box enclosed the sites for Visayas and Mindanao, the circle indicates the sampling sites in triangle for the sites in Mindanao.

Fig. 2a. Mt. Musuan

Fig. 2b. Mt. Apo

Fig. 2c. Mt. Timpoong

Fig. 2d. Mt. Kitanglad

Place and Duration of the Study

The study was conducted in selected mountains/ Key Biodiversity areas of Mindanao (Mt. Apo, Mt. Kitanglad, Mt. Timpoong and Mt. Musuan from April 2010 to April 2011 (Figs. 2A-D)..

Establishment of the Sampling Stations

The study was conducted within the forested areas of Mindanao. Two transect belts were assigned using the natural trail called transect belt I and II. Transect belt I was established from the base the peak of the of the selected mountains. Two 20 m x 20 m plots were established in each sampling site to survey the species richness and diversity of butterflies. Butterflies were collected in these sites with the use of a catching net and bait traps.

Sampling Technique

Transect walk sampling and plot sampling techniques were used to collect data for diversity, and richness of butterflies on selected Key Biodiversity Areas of Mindanao. Butterflies were observed, collected and counted in the transects across vegetation types. These data were recorded for the data on richness, altitude, type of vegetation, distribution, and abundance for the determination of diversity indices.

Diversity Assessment of Butterflies

Abundance, species richness and Shannon-Weiner diversity index were determined using BIO PRO software version 2.0 (McAleece 2000). Likewise cluster analysis to determine the similarity of communities based butterfly composition across vegetation types was done using BIOPRO software.

Preservation

Three specimens of butterflies per species were killed in a jar with lead acetate solution. These were stored in the triangular wax paper with moth balls to preserve them.

Classification, Identification and Description

Classification and initial identification of butterflies were done using books, journals, and photographs of identified specimens. The identification was confirmed by Colin G. Treadaway, in-charge of butterfly division in Senkenberg Museum, Frank port, Main Germany.

Assessment of Status

Status of butterflies was assessed using Treadaway's Checklist (1995).

Research Ethics

A permit was obtained from the leader of the indigenous communities and from the Department of Environment and Natural Resources for the conduct of the study.

RESULTS AND DISCUSSION

Species accumulation curve (Fig.3) showed that the sampling requirement is met. A total of two hundred forty seven (247) species of butterflies were sampled in sampling sites of 4 KBA's in Mindanao (Table 1). These species belong to 6 families of butterflies. Species richness of butterflies were high in Key Biodiversity Areas were plants are varied and human disturbance is less.

Butterfly abundance was highest in Mt. Kitanglad (3,543) individuals of 147 species, followed by Mt. Apo (2,349) individuals of 104 species, followed by Mt. Musuan (2,218) individuals of 116 species, Mt. Timpoong (438) individuals of 79 species. Maybe this was due to sampling frequency differences and the presence or absence of forest habitats. Butterfly species richness have the tendency to become richer in forest habitats than in highly disturbed areas. Shannon-Weiner index results (Fig.4 & Table 3) show that highest species diversity was observed in Mt. Kitanglad H'1.959, followed by Mt. Apo H'1.755, Mt. Musuan H'1.584 and Mt. Timpoong (1,579). Kruger (2005) in his study on insect diversity in apple and garden orchard reported that Shannon –Weiner index value 1.5 to 3 are fair levels, 4 to 6 are high levels of insect diversity. This may be due to sampling frequencies, biases and

maybe anthropogenic disturbance.

This result is consistent to Cameron (1999) where alpha diversity of insect was higher in woods of Texas prairies and Mohagan (2002, 2005; Ballentes et al. 2005, Mohagan and Treadaway 2010) in their study conducted in Mt Musuan, Mt Kalatungan and Mt Malindang and Mt. Hamiguitan on butterflies and other arthropods where diversity was highest in vegetation types were varied food plants are available and temperature ranges were optimum.

Heaney et al. (1989) studied the factors influencing the distribution of mammals of Mt. Makiling. They found out that variability in patterns of species diversity, endemism and distribution are influenced by two major factors: temporal (date and time) and spatial (country, region, faunal region, ecosystem , habitat and microhabitat) (Haribon 2000). The above results can be fully supported on the data of butterflies in this study.

Dendrogram of cluster analysis (Fig. 5) on the similarity of butterfly composition across Mountain ecosystems or KBAs showed three discernible clusters of habitats of butterflies that are ecologically alike. These simply suggest that species composition is influenced by geographic location (Haribon 2000), island formation and maybe age of the island. The mountain ecosystems of Mindanao are clustered together despite the presence of disconcordant species and low similarity index. Some species were highly specific in terms of habitat preferences (disconcordant species) and were mostly observed in the forested habitat in higher elevations. Most of them were endemic.

Table 1. Species composition of Butterflies in the four key biodiversity areas of Mindanao.

Family/Species	Status	Distribution (Dipterocarp, Montane,Mossy)
1.*Aeromachus musca Mabille 1876`*	rare endemic	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-upmasl
2.*Aeromachus plumbeola Felder 1867*	common Endemic	Mt. Kit. Dipterocarp forest, 24-30 degrees celcius, 400-900 masl
3.*Acestroides negrita fumatus Mabille 1876*	common	Mt. Musuan; Dipterocarp, 21-32 degrees Celcius, 300-400masl
4.*Baoris oceia Hewitson 1868*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
5.*Badamia exclamationis Fabricus 1876*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
6.*Bibasis gomata lorquini Mabille 1876*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
7.*Borbo cinnara Wallace 1866*	common	Mt. Musuan & Mt. Kit; Dipterocarp, 21-32 degrees Celcius, 300-up
8. *Caltoris bromus bromus* Leech 1893	rare	Mt. Apo, Montane , 17-19 degrees celcius, 1800 masl
9.*Caltoris philippina philippina Heirich Schaffer 1869*	commn	Mt. Musuan; Dipterocarp forest, 21-32 degres celcius, 300-400m
10. Caltoris cormasa Hewitson 1876	rare	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
11.*Cephrenes ocalle chrysozona Plotz 1883*	common	Mt. Kit.& Mt. Mus Dipterocarp forest, 24-30 degrees celcius, 400-900 masl
12.*Choaspes plateni adhara Fruhstorfer 1911*	rare	Mt. Apo & Mt. Kit., Montane , 17-19 degrees celcius, 1800 masl
13.*Coladenia ochracea De Jong & Treadaway 1992*	rare endemic	Mt. Kit. Dipterocarp forest, 24-30 degrees celcius, 400-900 masl
14.*Dodona deodata malindangensis Schroder & Treadaway 1988*	rare	Mt. Apo & Mt. Kit., Montane , 17-19 degrees celcius, 1800 masl
15.*Erionota thrax mindana Evans 1941*	common	Mt. Kit. & Mt. Mus.,Dipterocarp forest, 24-30 degrees celcius, 400-900 masl
16.*Gangara thrysis philippensis Frushtorfer 1910*	rare	Mt. Apo, Mt. Mus., Mt. Tim., & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-400 masl.
17.*Gerosis corona corona Semper 1892*	rare endemic	Mt. Mus., & Mt. Kit., Depterocarp forest, 21- 32 degrees celcius, 300-500 masl.
18.Halpe lutiesquama Mabille 1876	common endemic	Mt. Apo, Mt.Mus., Mt. Kit., & Mt. Tim., Depterocarp forest, 24-32 degrees celcius, 300-700 masl.
19.*Halpe purpurascens De Jong and Treadaway 1993*	rare endemic	Mt. Apo, Mt. Kit., Mt. Mus., Depterocarp forest, 24-34 degrees celcius, 300-700 masl.

Continuation of Table 1

20.*Hasora chromus chromus Cramer 1782*	rare	Mt. Mus., Mt.Kit.,& Apo; Depterocarp & Mon., forest 17-32 degrees celcius, 300-1800masl.
21. *Hasora moestissima moetissima* Mabille 1876	common	Mt.Kit.,& Mt. Apo; Depterocarp & Mon., fprest, 17-32 degrees celcius, 600-1900masl.
22. Hasora mixta mixta Mabille 1876	common	Mt. Kit.,& Apo; Depterocarp & Mon., forest, 17-32 degrees celcius, 600-1800masl.
23.*Mooreana princeps Semper 1892*	rare endemic	Mt.Kit.,& Mt. Apo; Depterocarp forest, 20-32 degrees celcius, 600-800masl.
24. Notocrypta feisthameli alinkara Frustorfer 1911	common	Mt. Kit., Apo, & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 600-750masl.
25.*Notocrypta paralysos volux Mabille 1883*	common endemic	Mt. Mus., Mt. Apo, Mt. Kit., & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
26.*Odontoptilum angulatum Helisa Semper 1892*	rare endemic	Mt. Mus., & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-600masl.
27.*Odontoptilum leptogramma Hewitson 1868*	common endemic	Mt. Mus., & Mt. Kit., Depterocar forest, 19-32 degrees celcius, 300-600masl.
28.*Oriens californica Scudder 1872*	common endemic	Mt. Kit., Mt. Apo. Mt. Mus., & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
29.*Parnara bada borneana Chiba & Eliot 1991*	rare	Mt. Mus., Mt. Apo, Mt. Kit., & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
30.*Pelopidas agna agna Moore 1866*	common	Mt. Mus., Mt. Apo, Mt. Tim., & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-600masl.
31.*Pelopidas conjuncta conjuncta Herrich-Schaffer 1869*	common	Mt. Apo, Mt. Kit., Mt. Mus., & Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
32.*Pelopidas mathias mathias Fabricus 1798*	common	Mt. Mus., Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
33.*Potanthus hetaerus hetaerus Mabille 1883*	common	Mt. Mus., & Mt. Apo.; Depterocarp forest, 19-32 degrees celcius, 300-600masl.
34.*Potanthus mingo mingo Edwards 1866*	common	Mt. Mus., Mt. Kit., Mt. Apo & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
35. *Potanthus omaha bione* Evans 1949	rare	Mt. Mus., Mt. Apo, & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-600 masl.
36.*Psolos fuligo fuligo* Mabille 1876	common	Mt. Apo & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
37. *Pyroneura toshikoae* Hayashi 1980	very rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
38.*Tagiades gana elegans Mabille 1877*	common endemic	Mt. Mus., Mt. Kit., Mt. Apo & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
39.*Tagiades japetus titus Plotz 1884*	common	Mt. Mus., Mt. Kit., Mt. Apo & Tim., Depterocarp forest, 19-31 degrees celcius 300-700 masl.
40.*Tagiades trebellius Martinus Plotz 1884*	common Endemic	Mt. Apo, Mt. Mus., Mt. Tim., Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
41.*Taractrocera luzonensis luzonensis Staudinger 1889*	common	Mt. Mus., Mt. Apo, Mt. Kit., & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.

Continuation of Table 1

42.*Telicota augias pythias Mabille 1877*	common Endemic	Mt. Apo, Mt. Mus., & Kit., Depterocarp foredst, 19-32 degrees celcius, 300-700 masl.
43.*Telicota colon vaja Corbet 1942*	rare	Mt. Mus., Mt. Apo, Mt. Kit., Depterocarp forest, 19-32 degrees celciius, 300-700 masl.
44.*Telicota ohara jania Evans 1949*	rare	Mt. Apo & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
45. *Xanthoneura obscurior*	undetermined	Mt. Apo, Depterpocarp forest, 19-32 degrees celciius, 500-700 masl.
46.*Xanthoneura telesinus Mabille 1878*	common endemic	Mt. Apo & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 500-700 masl.
Lycaenidae		
47. *Acytolapis puspa bazilana* Fruhstorfer 1910	rare	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
48. *Allotinus fallax aphacus* Fruhstorfer 1913	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
49. *Allotinus nigritus* Semper 1889	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
50.*Allotinus nivalis felderi Semper 1889*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
51. *Allotinus punctatus* Semper 1889	common endemic	Mt. Apo: Mon &Mosss, 9-21 degrees Celcius, 1800-2000masl
52. *Amblypodia narada plateni* Riley 1922	common	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
53.*Arhopola abseus amphea C and R Felder 1865*	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
54. *Arhopala agesias* Hewitson, 1862	uncommon	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
55. *Arhopala bazalus asagiae* Hayasi 1978	uncommon endemic	Mt. Apo & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
56.Arhopala staudinger staudinger Semper 1890	common endemic	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
57.*Arhopola theba Hewitson, 1863*	common endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
58. *Bendahara phocides origenes Frushtorfer 1912*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
59.*Caleta angola angola Hewitson 1876*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
60.*Caleta roxus angustior Staudinger 1889*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
61.*Catochrysops ancyra almora Druce 1873*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
62.*Catochrysop panormus exiguus Distant 1886*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.

Continuation of Table 1

63. Catochrysops strabo luzonensis Tite 1959	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
64. *Celarchus archagathos archagathos* Fruhstorfer 1910	uncommon endemic	Mt. Apo & Mt. Kit., Depterocarp forest, 19-32 degrees celcius, 300-700 masl.
65. Celastrina philippina philippina Semper 1889	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
67. *Dacalana akayamai* Hayashi, Schroeder& Treadawy 1983	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
68. *Dacalana monsapona monsapona* Schroeder &Treadaway, 1978	common endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
69. *Deramas tomokoae* Hayashi 1978	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
70.*Deudorix epejarbas coriolanus Frushtorfer 1912*	uncommon endemic	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
71. *Deudorix philippinensis* Schroeder, Treadaway	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
72. *Drupadia rufotaenia praecox* Cowan, 1974	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
73.*Everes lacturnus lacturnus Godart 1824*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
74.*Euchrysop cnejus cnejus Fabricius 1798*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
75. Flos fulgida zilana Frushtorfer 1900	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
76.*Hypolycaena amasa masaya* Takanami 1984	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
77. *Hypolycaena sipylus tharrytas* C & R. Felder 1862	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
78. *Hypolycaena shirozui shirozui* Hayashi 1981	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
79. Jamides alecto manilana Toxopeus 1930	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
80. Jamides bochus pulchrion Frushtorfer 1916	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
81. *Jamides callistus callistus Rober 1886*	rare	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
82. *Jamides celeno lydanius*	new record	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
83. *Jamides.cleodos trichonis* Fruhstorfer 1916	uncommon	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
84.*Jamides philatus osias Rober 1886*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
85.Lampides boeticus Linn*aeus 1767*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.

Continuation of Table 1

86.Megisba malaya sikkima Moore 1884	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
87.Melitus melanion melanion C and R Felder 1865	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
88. *Mondontides apona* Frushtorfer 1910	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
89.*Monodontides hondai Eliot & Kawazoe 1983*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
90.Nacaduba pavana georgi Frushtorfer 1916	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
91. *Neocherithra manata gertrudes* Schroeder & Treadaway 1983	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
92.Neopithecops salmora Salmora Butler 1870	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
93. *Pithecops corvus corax* Frustorfer, 1919	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
94.*Poritia philota phare Druce 1895*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
95. *Pratapa ismaeli tyotaroi* Hayashi, Schroeder, Treadaway, 1983	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
96. *Prosotas aluta philiata* Frustorfer 1916	uncommon	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
97.Prosotas nora semperi Frushtorfer 1916	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
98. *Rachana plateni plateni*	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
99.Rapala Caerulescens Staudinger 1889	common	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
100. *R. damona* Swinhoe,1890	rare endemic	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
101. *R. scintilla nemana* semper 1890	rare	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
102. *R. tomokae tomokae* Hayashi, Schroeder Treadaway 1978	common endemic	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
103. *Rapala tomokae takanamii* Hayashi 1984	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
104.Rapala varuna nada Frushtorfer 1912	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
105. *Sinthuza m. mindanensis* Hayashi, Schroeder and Treadaway, 1978	uncommon endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
106. *Sinthuza natsumiae natsumiae* Hayashi 1979	uncommon endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
107. *Tajuria deudorix deudorix* Hewitson, 1869	uncommon endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.

Continuation of Table 1

108. *Tajuria igolotiana fumiae* Hayashi, 1984	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
109. *Tajuria mantra vergara* Semper 1890	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
110. *Taraka hamada dustinkeani* Schroeder, Treadaway, Mohagan & Mohagan,	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
111. *Udara camenae filipina* Murayama & okamura 1972	uncommon	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
112. *Udara dilectissima luzona* Eliot& Kawazoe,1983	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
113. *U. selma mindanensis* Eliot and Kawazoe 1983	uncommon	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
114. *U.nishiyamai* Eliot & Kawazoe 1983	uncommon endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
115. *U. tyotaroi* Eliot & Kawazoe 1983	uncommon endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
116.Zizeeria kasandra Moore 1865	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
117.Zizina otis oriens Butler 1883	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
118.*Zizina hylax pygmaea Snellen 1876*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
Nymphalidae		
119.*Acrophtalmia leto ochine Semper 1887*	Mindanao endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
120.Amathusia phidippus pollicaris Buttler 1870	common rare	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
121. Anosia melanippus edmondii Lesson 1837	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
122. *Athyma kasa gordia* C & R Felder 1863	new record	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
123.Athyma maenas semperi Moore 1896	common rare	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
124.Bassarona piratica piratica Semper 1888	rare endemic	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
125. *Cethosia luzonica magindanica* Semper 1888	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
126.*Charaxes amycus carolus Rothschild 1900*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
127.Charaxes solon shohgun Tsukada 1991	rare	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
128.*Cupha arias dapatana Felder 1867*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl

Continuation of Table 1

129. *Cyrestis kudrati* Jumalon 1975	rare endemic	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
130. *Cyrestis maenalis rizali* Tsukada & Nishiyama1985	common	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
131.Discopora philippina Moore 1895	common endemic	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
132.Doleschalia bisaltidae philippensis Fruhstorfer 1899	common rare	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
133.*Doleschallia bisaltidae philippensis Fruhstorfer 1899*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
134.*Euploea blossomae sibulanensis Jumalan 1971*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
135.*Euthalia alpheda cusama Fruhstorfer 1913*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
136.*Euthalia lubentina philippenensis Frustorfer 1899*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
137. *Euploea mulciber mindanensis* Staudinger 1885	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
138. *Euploea tobleri snelleni* Moore 1883	rare	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
139. *Elymnias beza beza* Hewitson 1877	common endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
140. *Elymnas esaca georgi* Frustorfer 1907	common rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
141. *Hypolimnas anomala anomala* Wallace 1868	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
142.Hypolimnas bolina philippensis Fruhstorfer 1899	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
143.Hypolimnas missipus Linn*aeus 1769*	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
144. *Ideopsis ganura glaphyra* Moore 1883	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
145. *Ideopsis juventa manillana* Moore 1883	commo	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
146.Junonia almana almana Linn*aeus1758*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
147.Junonia hedonia ida Cramer 1775	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
148.Junonia orithya leucasia Fruhstorfer 1912	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
149. *Kaniska canace oplentia Tsukada 1885*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
150.Lassipa ebusa laetitia Fruhstorfer 1908	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.

Continuation of Table 1

151.Lethe chandica byzaccus Fruhstorfer 1911	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
152. Lethe europa cervana	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
153. *Lexias panopus miscus* Frustorfer 1913	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
154. *Melanitis atrax atrax* C. & R. Felder 1863	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
155.Melanitis leda leda Linn*aeus 1758*	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
156.Melanitis zitenius xantophthalmus Staudinger 1889	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
157.Moduza mata amida Fruhstorfer 1912	rare	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
158.*Moduza thespias Semper 1889*	rare endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
159. *Mycalesis ita teatus* Frustorfer 1911	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
160.Mycalesis mineus philippina Moore 1892	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
161.Mycalesis janardana micromede Frushtorfer 1900	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
162.Mycalesis felderi felderi Butler 1868	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
163. *Mycalesis treadawayi cotabatana* Semper and Treadaway, 1991	common endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
164. *Neptis cymela nitetus* Hewitson 1868	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
165 *Neptis cyra vibusa* Semper 1889	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
166.Neptis pampanga boholica Moore 1899	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
167.Neptis mindorana pseudosoma moore 1899	common	Mt Apo n Mt. Timp; Mon & Moss., 9-21degrees celcius, 1800-2000
168.Orsotriaena medus medus Fabricius 1775	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
169.*Parantica dannatti diuataensis Takei & Yamamoto 1980*	South Mindanao endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
170.*Parantica dannatti reyesi Schroeder & Treadaway 1984*	Mt. Parker endemic (Mt. apo)	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
171. *Parantica luzonensis luzonensis C* & R Felder 1863	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
172.*Parantica vitrina oenone Butler 1865*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl

Continuation of Table 1

173. Parthenos sylvia philippensis Fruhstorfer 1898	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
174.Pantoporia cyrilla athenais C. & R. Felder 1863	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
175.Phaedyma columella messogaia Frushtorfer 1912	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
176.Phalantha phalanta phalanta Drury 1773	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
177.*Polyura athamas acuta Ruthschild 1899*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
178. *Ptychandra schadenbergi* Semper 1887	rare endemic	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
179.*Ragadia melindena melindena C & R Felder 1863*	rare endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
180. *Rhinapalpa polynice validice* Frustorfer 1912	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
181.Rhona rhea danae Fruhstorfer 1906	common	Mt. Apo, Mt. Kit., & Mt. Tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
182. *Symbrenthia lilaea semperi* Moore 1899	common	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
183. *Symbrenthia hippoclus anna* Semper 1888	common	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
184.*Symbnenthia rana Staudinger 1889*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
185.Symbrenthia hypsilis sinica	uncommon	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
186. Tacola magindana magindana Semper 1878	rare endemic	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
187.*Tanaecia leucotaenia aquamarina Frushtorfer 1912*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
188. Vanessa cardui Linnaeus 1761	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
189. Vanessa dejeanii mounseyi Talbot 1936	rare	Mt. Apo; Mon., & Moss, 9-21 degrees celcius, 1800-2000 masl.
190.*Vanessa indica indica Herbst 1794*	common	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
191. Vagrans sinha sinha Kollar 1844	common	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
192.Vindula dejone dejone Erichson 1834	common	Mt. Kit., Apo, & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-700 masl.
193.Ypthima sensilis Kashiwai 1982	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
194. Y. sempera chaboras Fruhstorfer 1911	rare	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m

Continuation of Table 1

195. Ypthima stellera stellera Eschscholtz 1812	common endemic	Mt. Kit, Mt. Musuan;Dipterocarp forest, 19-32 degrees, 700-900 m
196.Yoma sabina podium	common	Mt. Kit., Mt. Apo, Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-700 masl.
197. Zethera musa C. & R. Felder 1816	rare	Mt.Apo & Mt. Kit.,Dipterocarp forest, 19-32 degrees celcius, 600-800 masl.
Papilionidae		
198. *Arisbe euphratoides* Elmer 1889	rare eastern Mindanao endemic	Mt. Apo, Mon., & Moss, 9-21 degrees celcius, 1500-2000 masl.
199. *Arisbe eurypylus gordion* C & R Felder 1964	common	Mt. Apo & Kit., Dipterocarp forest, 19-32 degrees celcius, 300-1500 masl.
200. *Achilides palinurus daedalus* C & R Felder 1861	common endemic	Mt. Kit., & Mus., Dipterocarp forest, 19-32 degrees celcius, 300-1200 masl.
201. *Atrophaneura semperi aphthonia* Ruthschild 1908	rare	Mt. Apo & Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1200 masl.
202. *Atrophaneura semperi semperi* C & R. Felder 1861	rare endemic	Mt. Mus., & Tim., Dipterocarp forest, 19-32 degrees celcius, 300- 1200 masl.
203.*Graphium sandawanun joreli Nuyda 1994*	rare endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
204. *Graphium sandawanum sandawanum* Yamamoto 1977	rare endemic	Mt. Apo, Mon., & Moss, forest, 9-21 degrees celcius, 1700-2000 masl.
205. *Graphium agamemnon agamemnon* Linnaeus 1758	common	Mt. Kit.,Mt. Apo, Mt. Mus., & Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1200 masl.
206. *Graphium sarpedon sarpedon* Linnaeus 1758	common	Mt. Kit., Mt. Apo, Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-700 masl.
207. *Lamproptera meges decius* C & R Felder 1862	common	Mt.Kit., Dipterocarp forest, 19-32 degrees celcius, 700-1200 masl.
208. *Menelaides deiphobus rumanzovia* Eschscholtz 1821	common endemic	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
209. *Menelaides helenus hystaspes* C & R Felder 1862	common endemic	Mt. Kit., Mt. Mus., Mt. Apo, & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
210. *M. polytes ledebouria*Eschscholtz 1821	common	Mt. Mus., Mt. Tim., Mt. Kit., & Mt. Apo, Dipterocarp forest, 19-32 degrees celcius, 300- 1400 masl.
211. *Pacliopta kotzebuea philippus* semper 1891	common	Mt. Apo & Mt. Tim., Dipterocar forest, 19-32 degrees celcius, 300-1400 masl.
212. *Papilio demolius libanius* Frustorfer 1908	common	Mt. Mus.,Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
213. *Troides rhadamanthus* Lucas 1835	common endemic	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
Pieridae		
213.Appias albina albina Boisduval 1836	common	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl

Continuation of Table 1

214.*Appias nephele elis Fruhstorfer 1910*	uncommon	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
215. *Appias nero zamboanga* C & R Felder 1862	common	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
216. *Appias nero boholensis* M. & T. Okano 1989	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
217.*Appias olferna peducaea Fruhstorfer 1910*	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
218.*Catopsila scylla asema Staudinger 1885*	common	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
219.*Catopsila p. pomona Fabricius 1775*	common	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
220.*Catopsila p. pyranthe* Linn*aeus 1758*	common	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
221.*Cepora aspasia orantia Fruhstorfer 1910*	common	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
222.*Delias apoensis apoensis* Talbot 1928	Mt. Apo endemic	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
223.*Delias apoensis maizurui Yagashita & Nakano 1993*	uncommon	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
224.*Delias blanca apameia Fruhstofer 1910*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
225.*Delias diaphana diaphana Semper 1878*	endemic	Mt. Apo, Mt. Kit., & Mt. tim., Depterocarp forest, 19-32 degrees celcius, 300-700masl.
226. *Delias henningia henningia* Eschscoltz 1821	common	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
227.*Delias hyparete luzonensis C. & R. Felder 1862*	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
228.*Delias hyparete mindanaensis Mitis 1893*	common	Mt. Timpoong; Dipterocarp forest, 19-31 degress celcius, 1,200 m
229. *Delias levicki levicki* Ruthschild 1927	Mt Apo endemic	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
230.*Delias levicki justini Samusawa & Kawamura 1988*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
231.*Delias o. ottonia Semper 1890*	uncommon/ endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
232. *Delias schoenigi schoenigi* Schroeder 1975	Mt.Apo endemic rare	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
233.*Delias schoenigi hermeli Samusawa & Kawamura 1988*	uncommon	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
234.*Delias woodi woodi* Talbot 1928	Mt. Apo endemic	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
235.*Delias woodi colini Schroder1977*	rare	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl

Continuation of Table 1

236.*Eurema blanda vallivolans Butler 1883*	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
237.*Eurema alitha alitha C. & R. Felder 1862*	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
238.*Eurema hecahe tamiathis Frushtorfer 1910*	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
239.*Eurema hiurai hiurai Shirozu & Yata 1977*	rare endemic	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl
240.Eurema lacteola lacteola Distant 1886	rare	Mt. Musuan; Dipterocarp, 24-32 degrees Celcius, 300-400masl
241.*Eurema sarilata sarilata Semper 1891*	uncommon	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
242.*Eurema simulatrix simulatrix Staudinger 1891*	uncommon	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
243.*Hebemoia glaucippe iliaca Frustorfer 1911*	common	Mt. Kit., Mt. Apo, Mt. Mus., & Mt. Tim., Dipterocarp forest, 19-32 degrees celcius, 300-1400 masl.
244.*Leptosia nina terentia Fruhstorfer 1910*	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
245. *Pareronia boebera boebera* Escholtz 1821	common	Mt. Apo, Mon., & Dipterocarp forest, 9-31 degrees celcius, 1700-2000 masl.
246. Pareronia boebera trinobantes Fruhstorfer 1911	common	Mt. Kit., Apo, Mt. Tim., Dipterocarp forest, 19-32 mdegrees celcius, 300-800 masl.
Riodinidae		
247.*Abisara mindanaensis mindanaensis Semper 1892*	uncommon	Mt. Kit;Mon., & Moss, 9-21 degrees celcius, 1800-2000masl

Table 2. Diversity for butterflies of 4 KBA's in Mindanao

Index	Mt. Timpoong , Camiguin	Mt. Apo -Kidapawan	Mt. kitanlad, Bukidnon	Mt. Musuan
	Is.			
Shannon H' Log Base 10.	1.579	1.755	1.959	1.584
Shannon Hmax Log Base 10.	1.869	2.017	2.204	1.785
Shannon J'	0.845	0.87	0.889	0.887

Table 3. Shannon-Weiner index for butterflies of 4 KBA's in Mindanao

Sample	Mean Individuals	Total Individuals	Total Species
Mt. Musuan	26.972	6716	114
Mt. Timpoong	13.667	3403	79
Mt. Apo	10.735	2673	104
Mt. Kitanglad	19.426	4837	148

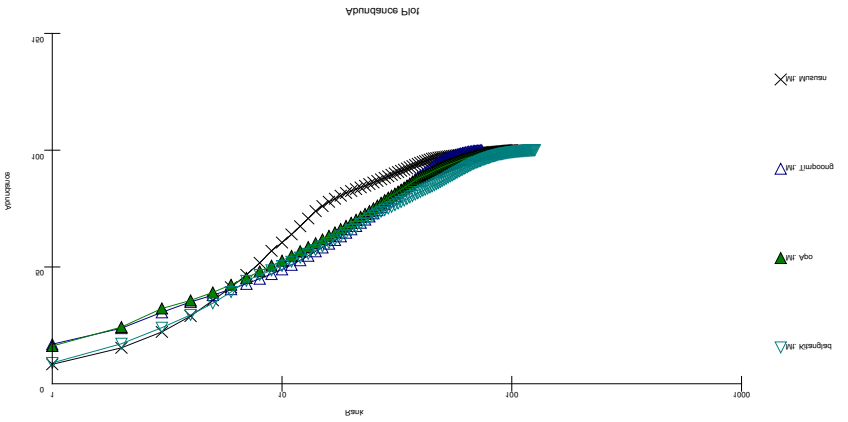

Fig. 3. Species accumulation curve for butterflies of 4 KBAs in Mindanao

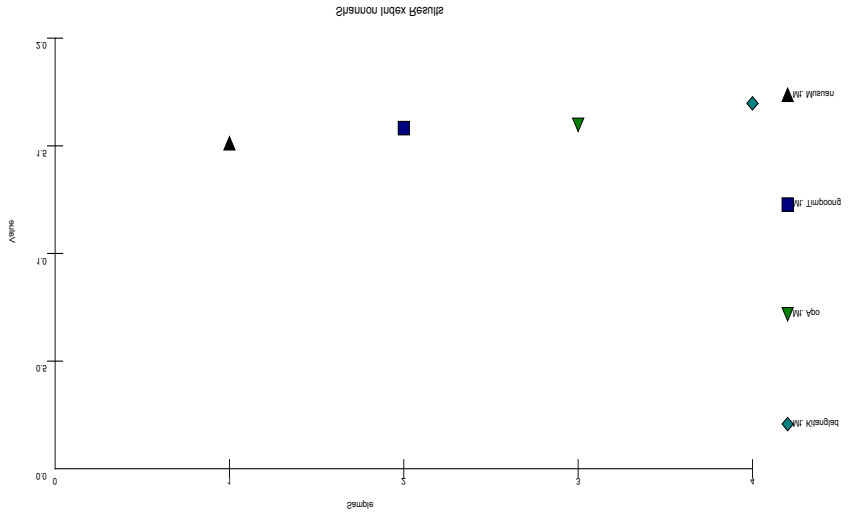

Fig. 4. Shannon-Weiner Index plot for butterflies of 4 KBAs in Mindanao

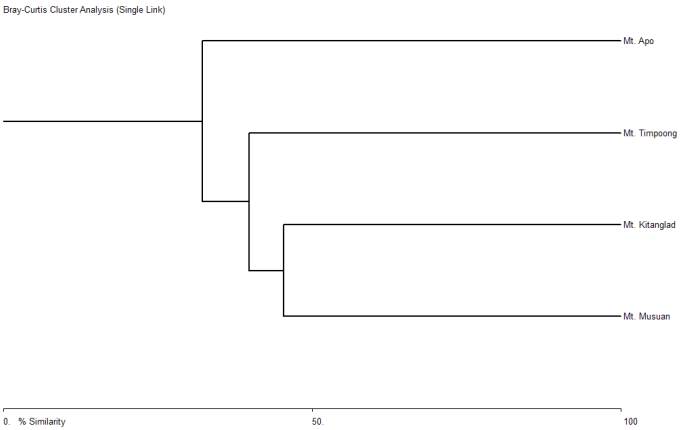

Fig. 5. Dendrogram for species composition of 4 KBA's in Mindanao

Status of Butterflies

A total of 105 species of endemic butterflies were listed from 4 different sample sites of Mindanao at about 42 % of the total sample plus (4) new record in Mindanao based on Treadaway, 1995 checklist (Table 4 below). Three of the endemic species were site endemic, 2 were eastern Mindanao endemic, 3 were very rare endemic, 51 were rare endemic. Two were very rare, 62 rare, 1 rediscovery and 149 disconcordant species. Mt. Apo had the highest endemism followed by Mt. Timpoong, Mt. Kitanglad, and Mt. Musuan. It was observed that endemism was higher in higher elevations with unique vegetation and also in isolated places like Mt. Timpoong. This result simply suggests the importance of the forest habitats in the higher elevation as home of the endemics. Though Mt. Musuan had high species richness, its location in the lowland influences its low in endemism. The endemism in Mt. Apo is quite high as compared to other sites studied. This may be due to unique location, plant species composition (possible food plants of butterflies) and unique habitat that influence the existence of flora and fauna.

Some endemic butterflies from Mt. Apo

Fig. 2. a *Celarchus a. archagathos*
Common Endemic

Fig. 2.b. *Dacalana m. monsapana*
Rare Endemic

Fig. 2.c. *Hestinalis w.waterstradti*
Rare Endemic

Fig. 2. d *Rachana p. plateni*
Rare Endemic

Fig. 2.e.*Neocherithra manata gertrudes*
Rare

Fig. 2.f. *Delias s. schoenigi*
Rare

Table 4. Status of Butterflies in 4 KBA's in Mindanao

Status Assessment Category	Mt. Apo ABM	Mt. Kitanglad ABM	Mt. Timpoong ABM	Mt. Musuan ABM
Total endemism %endemism	42/104 42%	29/148 19.6%	22/29 27.8%	12/116 1.72%
Site Endemic	1	2		
Eastern Mindanao Endemic	1	1		
Very Rare Endemic	1	1	1	
Rare Endemic	25	14	7	4
Common endemic	14	9	14	8
Very rare	-	1	1	
Rare	13	25	16	4
New Record	1		3	
Rediscovery				1
Disconcordant Species	55	37	16	31

CONCLUSIONS AND RECOMMENDATIONS

Species composition of butterflies in different sampling sites vary from one site to another, food plants, geographic location, age and island formation might have influence species composition. Diversity of butterflies is somewhat proportional to the size of the mountain, the higher the elevation the higher the diversity level for butterfly or it may be influenced by age and mountain location. Endemism of butterflies is higher in higher elevations or Key Biodiversity Areas where vegetation are varied. A two year monitoring on butterflies is recommended to sample more endemic and new species which remain to be discovered in the sampling sites and give a better representative samples in areas which are not extensively sampled to generate a more accurate picture on the status of butterflies in the area.

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